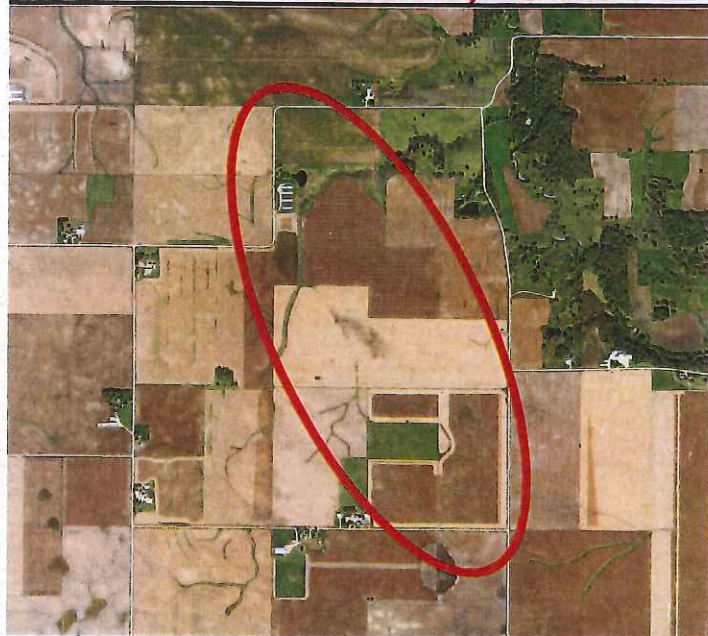


HARDIN COUNTY, IOWA

2016



**SUPPLEMENT TO
ENGINEER'S
REPORT ON REPAIR OR
IMPROVEMENTS TO
MAIN OF
DRAINAGE DISTRICT 102
HARDIN COUNTY**



I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA

Lee O. Gallentine PE Aug 23, 2016
LEE O. GALLENTINE, P.E. DATE

LICENSE NUMBER: 15745
MY LICENSE RENEWAL DATE IS DECEMBER 31, 2016
PAGES OR SHEETS COVERED BY THIS SEAL:
SHOWN ON TABLE OF CONTENTS

RYKEN

ENGINEERING & LAND SURVEYING, INC.

OFFICE LOCATIONS

739 Park Avenue
Ackley, IA. 50601
Phone: 641-847-3273
Fax: 641-847-2303

103 East State Street, Ste 430
Mason City, IA 50401
Phone: 641-423-1451
Fax: 641-423-1659

511 Bank Street
Webster City, IA 50595
Phone: 515-832-1876
Fax: 515-832-1932

Licensed and Insured for over 50 years

Ryken@RykenEng.com
www.RykenEng.com

Supplement to Engineer's Report on Repair or Improvements to Main of Drainage District No. 102, Hardin County, Iowa

Table of Contents	Pg. 1
Report	
Introduction	Pg. 2
Improvement Method	Pgs. 2-3
Opinion of Probable Construction Cost	Pg. 3
Recommendations	Pg. 3
Appendices	
Location Maps of Improvement	App. X
Main Capacities Chart - Hybrid (Improvement)	App. Y
Opinion of Probable Construction Cost - Hybrid (Improvement)	App. Z

Supplement to Engineer's Report on Repair or Improvements to Main of Drainage District No. 102, Hardin County, Iowa

1.0 **INTRODUCTION** – The Hardin County Board of Supervisors, acting as District Trustees, requested Ryken Engineering to supplement the original report concerning repair and improvement to the main tile of Drainage District No. 102. The purpose of this supplement is to add a hybrid alternative of replacing the lower end of the existing main tile with an open ditch and replacing the upper end of said existing main tile with a larger tile. For reference, this request occurred at the public hearing held on August 10, 2016.

2.0 **IMPROVEMENT METHOD** – To improve drainage for the main tile as discussed in the original report, the following is an additional option:

Hybrid (Tile Upsizing and Open Ditch Installation)

- Remove and replace the existing main tile with an open ditch (bottom width of 8 feet, side slopes of 2 to 1 or flatter, and depths ranging from 12 feet to 3 feet) on the lower end of the main (976 feet for ½" coefficient and 1,501 feet for 1" coefficient). For reference, a chart with the open ditch capacities is included in Appendix Y.
- Remove and replace the existing main tile with new main tile of a larger size on the upper end of the main (i.e. upstream of the open ditch). For reference, a chart with the required tile sizes and capacities is included in Appendix Y.
- Typically, the upsized main tile and open ditch would be in the same location as the existing main tile in order to locate private and lateral tiles. For reference, the route and limits for each coefficient are shown on the maps included in Appendix X.
- Disconnect all private and lateral tile encountered from the existing main tile.
- Reconnect all private and lateral tile to the new main tile or extend them to discharge into the open ditch.

With the above mentioned improvement methods, the following should be noted:

- The proposed and existing capacities shown in Appendix Y are based on the assumptions that the 1917 main tile is both installed per its respective design and that it is functioning at full capacity (i.e. not collapsed, broken, etc).
- The open ditch installation method would involve the taking of right of way. However, some of this right of way may currently be grassed waterway.
- The pipe sizes shown in Appendix Y are those that are currently manufactured that meet or exceed the ½" and 1" drainage coefficients.
- Improvements have historically been viewed as having an impact on jurisdictional wetlands. As such, individual landowners should consult with applicable staff at the Hardin County NRCS office to determine the existence of said jurisdictional wetlands and what said impact may be on them.

Per Iowa Code Chapter 468.126, the above actions would be considered an improvement. As such, Subsection 4, paragraph c of Chapter 468.126 states "If the estimated cost of the improvement does not exceed fifty thousand dollars, the board may order the work done without conducting a hearing on the matter. Otherwise, the board shall set a date for a hearing on whether to construct the proposed improvement and whether there shall be a reclassification of benefits

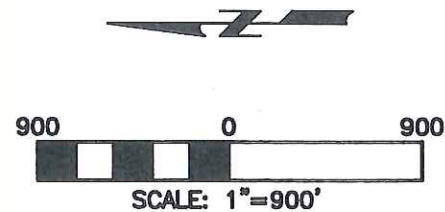
for the cost of the proposed improvement." The opinion of probable construction cost contained in the Opinion of Probable Construction Cost section of this report exceeds said \$50,000 limit. Therefore, a hearing or continuation of the August 10, 2016 hearing will be required. Per Iowa Code Chapter 468.126.4.e, the right of remonstrance may apply to the proposed improvement.

- 3.0 **OPINION OF PROBABLE CONSTRUCTION COST** – Using the above method of improvement, an itemized list of project quantities and associated opinion of probable construction cost was compiled and is included in Appendix Z of this report. A summary of said costs are as follows:

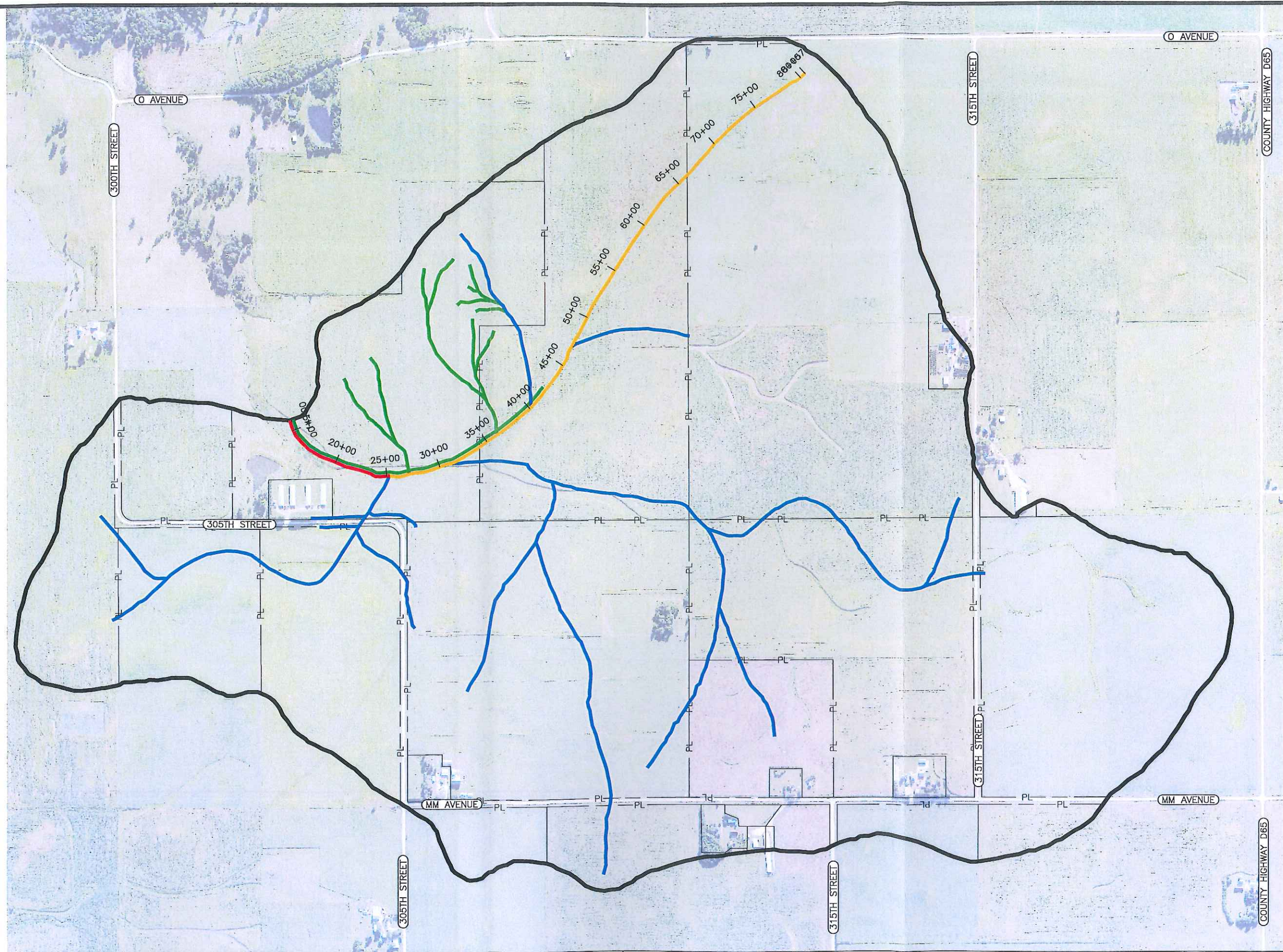
<u>METHOD</u>	<u>DRAINAGE COEFF.</u>	<u>TOTAL COST</u>
Hybrid (Improvement)	½"	\$ 612,156.60
	1"	\$ 686,551.80

It should be noted that said costs include materials, labor, and equipment supplied by the contractor to complete the necessary repair or improvement and includes applicable engineering, construction observation, and project administration fees by Ryken Engineering. It also includes right of way acquisition for the open ditch option only (assumed to require 2.5 acres at \$12,000 per acre for ½" coefficient and 3.5 acres at \$12,000 per acre for 1" coefficient). However, said costs do not include any interest, legal fees, county administrative fees, crop damages, other damages, previous repairs, engineering fees to date, or reclassification fees (if applicable). As always, all costs shown are opinions of Ryken Engineering based on previous lettings on other projects. Said costs are just a guideline and are not a guarantee of actual costs.

- 4.0 **RECOMMENDATIONS** – There is a definite need to perform either the above improvement or one of the repairs or improvements mentioned in the original report. Therefore, it is recommended that the Hardin County Board of Supervisors, acting as District Trustees, should take the actions stated in the original report.



- EXISTING PRIVATE TILE
- EXISTING LATERAL TILE
- EXISTING MAIN TILE TO BE CHANGED TO OPEN DITCH
- EXISTING MAIN TILE TO BE UPSIZED



DRAWN BY: CCS	APPROVED BY: LOG	REVISIONS:
DATE: 8/22/2016	PROJ. NO.: 6762.3	
FIELD BY:		
P:\6762.3\CADD\CONCEPTS\6762.3 - CONCEPTS--5.DWG; 8/22/2016		

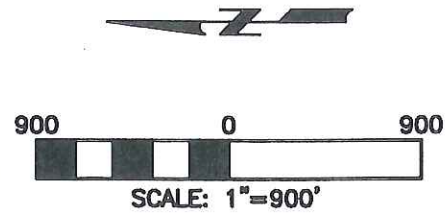
RYKEN
ENGINEERING & LAND SURVEYING, INC.
ACKLEY, MASON CITY & WEBSTER CITY, IOWA

ADDRESS:
739 PARK AVENUE
ACKLEY, IOWA 50601
PH 641-847-3273 FAX 641-847-2303

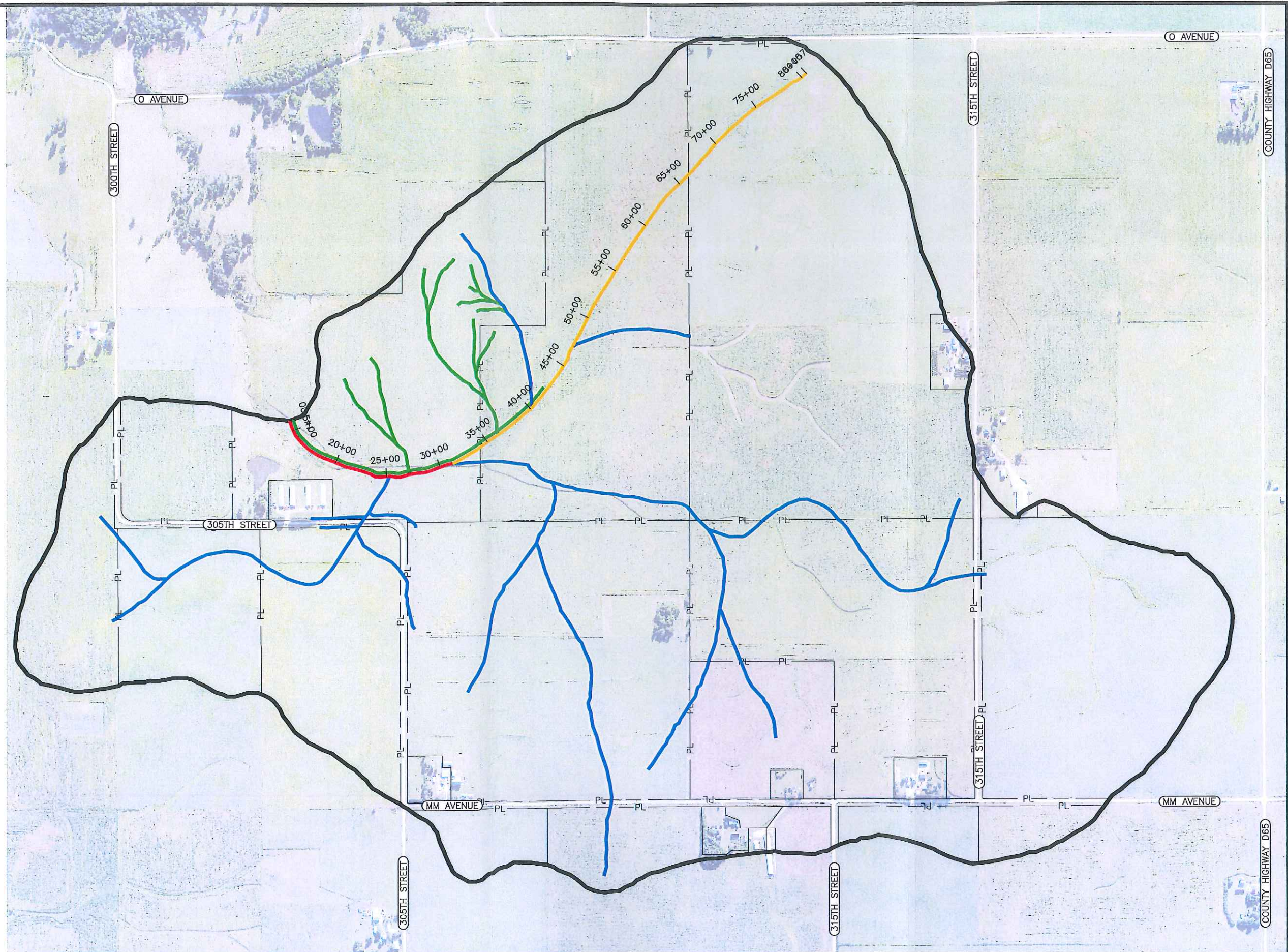
PROJECT:
DRAINAGE DISTRICT #102
HARDIN COUNTY, IOWA
2016

SHT. NAME:
LOCATION MAP OF HYBRID IMPROVEMENT
($\frac{1}{2}$ " COEFFICIENT)

SHT. NO.:
1 OF 1



- EXISTING PRIVATE TILE
- EXISTING LATERAL TILE
- EXISTING MAIN TILE TO BE CHANGED TO OPEN DITCH
- EXISTING MAIN TILE TO BE UPSIZED



DRAWN BY: CCS	APPROVED BY: LOG	REVISIONS:
DATE: 8/22/2016	PROJ. NO.: 6762.3	
FIELD BK: -		
P:\6762.3\CADD\CONCEPTS\6762.3 - CONCEPTS-1.DWG; 8/22/2016		

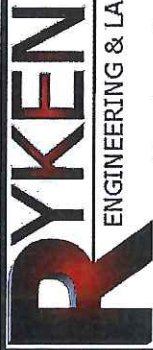
RYKEN
ENGINEERING & LAND SURVEYING, INC.
ACKLEY, MASON CITY & WEBSTER CITY, IOWA

ADDRESS:
739 PARK AVENUE
ACKLEY, IOWA 50601
PH 641-847-3273 FAX 641-847-2303

PROJECT:
DRAINAGE DISTRICT #102
HARDIN COUNTY, IOWA
2016

SHT. NAME:
LOCATION MAP OF HYBRID IMPROVEMENT
(1" COEFFICIENT)

SHT. NO.:
1 OF 1



Engineer's Opinion of Main Capacities

Project: Main Tile **Improvements** for D.D. #102

Location: Sections 18 and 19, T86N, R20W, Hardin County, Iowa

By: L.O.G.

Date: 8/19/2016

Checked By: L.O.G.

Date: 8/22/2016

TILE REPLACEMENT HYBRID (OPEN DITCH AND TILE UPSIZING) - IMPROVEMENT

STA		DESCRIPTION	INSTALLED		IMPROVEMENT (HYBRID)			
					1/2" DRAINAGE COEF.		1" DRAINAGE COEF.	
			ORIGINAL INSTALLED TILE SIZE (in)	ORIGINAL INSTALLED TILE CAPACITY (in*acres/day)	OPEN DITCH OR UPSIZING TILE SIZE (in)	IMPROVED MAIN CAPACITY (in*acres/day)	OPEN DITCH OR UPSIZING TILE SIZE (in)	IMPROVED MAIN CAPACITY (in*acres/day)
14+00		Main Tile Outlet	28	0.30	Open	6.6	Open	6.6
23+75		Connection with Lateral 1 Pipe size change 28" - 26"	26	0.25	Open	6.8	Open	6.8
23+76		Upstream of Connection with Lateral 1	26	0.31	30	0.45	Open	8.3
29+00		Connection with Lateral 7 Pipe size change 26" - 20" Grade Change 0.18% - 0.10%	20	0.12	30	0.57	Open	8.7
29+01		Upstream of Connection with Lateral 7	20	0.30	24	0.49	30	1.02
42+50		Connection with Lateral 13 Pipe size change 20" - 18"	18	0.25	24	0.54	30	0.99
42+51		Upstream of Connection with Lateral 13	18	0.26	24	0.57	30	1.03
49+00		Connection with Lateral 14 Pipe size change 18" - 15"	15	0.18	24	0.62	30	1.12
49+01		Upstream of Connection with Lateral 14	15	0.31	18	0.51	24	1.10
57+20		Pipe size change 15" - 12"	12	0.27	12	0.78	24	1.69
63+00		Pipe size change 12" - 8" Grade Change 0.10% - 0.40%	8	0.20	8	0.58	18	1.70
70+00		Pipe size change 8" - 6" Grade Change 0.40% - 1.60%	6	0.40	8	0.87	12	2.56
77+00		Grade Change 1.60% - 0.70%	6	0.95	8	2.05	8	2.05
81+50		End Main Tile						



ENGINEERING & LAND SURVEYING, INC.

By: L.O.G.

Date: 8/19/2016

Checked By: L.O.G.

Date: 8/22/2016

Engineer's Opinion of Probable Construction Cost

Project: Main Tile **Improvements** for D.D. #102

Location: Sections 18 and 19, T86N, R20W, Hardin County, Iowa

TILE REPLACEMENT HYBRID (OPEN DITCH AND TILE UPSIZING) -
IMPROVEMENT ($\frac{1}{2}$ " COEFFICIENT)

ITEM #	DESCRIPTION	Unit Cost	Units	Quantity	Units	Total Cost
CONSTRUCTION COSTS						
601	OPEN DITCH CONSTRUCTION	\$ 2,500.00	STA	9.76	STA	\$ 24,400.00
602	30" DUAL WALL TILE	\$ 65.00	LF	525	LF	\$ 34,125.00
603	24" DUAL WALL TILE	\$ 60.00	LF	2000	LF	\$ 120,000.00
604	18" DUAL WALL TILE	\$ 50.00	LF	819	LF	\$ 40,950.00
605	12" DUAL WALL TILE	\$ 40.00	LF	580	LF	\$ 23,200.00
606	8" DUAL WALL TILE	\$ 30.00	LF	1850	LF	\$ 55,500.00
607	30" X 24" DUAL WALL REDUCER	\$ 1,000.00	EA	1	EA	\$ 1,000.00
608	24" X 18" DUAL WALL REDUCER	\$ 750.00	EA	1	EA	\$ 750.00
609	18" X 12" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
610	12" X 8" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
611	CMP OUTLET (LATERAL 1)	\$ 55.00	LF	40	LF	\$ 2,200.00
612	30" X 30" X 18" DUAL WALL WYE (LATERAL 7 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
613	24" X 24" X 8" DUAL WALL WYE (LATERAL 13 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
614	24" X 24" X 8" DUAL WALL WYE (LATERAL 14 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
615	HEADWALL	\$ 10,000.00	EA	1	EA	\$ 10,000.00
616	RIP-RAP	\$ 40.00	TN	100	TN	\$ 4,000.00
617	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	4	EA	\$ 6,000.00
618	CONCRETE COLLAR	\$ 400.00	EA	5	EA	\$ 2,000.00
619	REMOVE EXISTING TILE	\$ 10.00	LF	6750	LF	\$ 67,500.00
620	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	30	EA	\$ 15,000.00
621	SURFACE DRAINS	\$ 2,000.00	EA	5	EA	\$ 10,000.00
622	PRIVATE TILE OUTLETS	\$ 1,500.00	EA	5	EA	\$ 7,500.00
623	SEEDING (OPEN DITCH)	\$ 500.00	STA	9.76	STA	\$ 4,880.00
624	RIGHT OF WAY	\$ 12,000.00	AC	2.5	AC	\$ 30,000.00
CONSTRUCTION SUBTOTAL						\$ 463,755.00
Contingency (10%)						\$ 46,375.50
CONSTRUCTION TOTAL						\$ 510,130.50
Engr. & Const. Observation (20%)						\$ 102,026.10
TOTAL COST						\$ 612,156.60

TILE REPLACEMENT HYBRID (OPEN DITCH AND TILE UPSIZING) -
IMPROVEMENT (1" COEFFICIENT)

CONSTRUCTION COSTS						
701	OPEN DITCH CONSTRUCTION	\$ 2,500.00	STA	15.01	STA	\$ 37,525.00
702	30" DUAL WALL TILE	\$ 65.00	LF	1999	LF	\$ 129,935.00
703	24" DUAL WALL TILE	\$ 60.00	LF	1400	LF	\$ 84,000.00
704	18" DUAL WALL TILE	\$ 50.00	LF	700	LF	\$ 35,000.00
705	12" DUAL WALL TILE	\$ 40.00	LF	700	LF	\$ 28,000.00
706	8" DUAL WALL TILE	\$ 30.00	LF	450	LF	\$ 13,500.00
707	30" X 24" DUAL WALL REDUCER	\$ 1,000.00	EA	1	EA	\$ 1,000.00
708	24" X 18" DUAL WALL REDUCER	\$ 750.00	EA	1	EA	\$ 750.00
709	18" X 12" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
710	12" X 8" DUAL WALL REDUCER	\$ 500.00	EA	1	EA	\$ 500.00
711	CMP OUTLET (LATERAL 1)	\$ 55.00	LF	40	LF	\$ 2,200.00
712	CMP OUTLET (LATERAL 7)	\$ 55.00	LF	40	LF	\$ 2,200.00
713	30" X 30" X 8" DUAL WALL WYE (LATERAL 13 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
714	30" X 30" X 8" DUAL WALL WYE (LATERAL 14 CONNECTION)	\$ 1,250.00	EA	1	EA	\$ 1,250.00
715	HEADWALL	\$ 10,000.00	EA	1	EA	\$ 10,000.00
716	RIP-RAP	\$ 40.00	TN	150	TN	\$ 6,000.00
717	HICKENBOTTOM INTAKE	\$ 1,500.00	EA	4	EA	\$ 6,000.00
718	CONCRETE COLLAR	\$ 400.00	EA	5	EA	\$ 2,000.00
719	REMOVE EXISTING TILE	\$ 10.00	LF	6750	LF	\$ 67,500.00
720	PRIVATE TILE CONNECTIONS	\$ 500.00	EA	27	EA	\$ 13,500.00
721	SURFACE DRAINS	\$ 2,000.00	EA	8	EA	\$ 16,000.00
722	PRIVATE TILE OUTLETS	\$ 1,500.00	EA	8	EA	\$ 12,000.00
723	SEEDING (OPEN DITCH)	\$ 500.00	STA	15.01	STA	\$ 7,505.00
724	RIGHT OF WAY	\$ 12,000.00	AC	3.5	AC	\$ 42,000.00
CONSTRUCTION SUBTOTAL						\$ 520,115.00
Contingency (10%)						\$ 52,011.50
CONSTRUCTION TOTAL						\$ 572,126.50
Engr. & Const. Observation (20%)						\$ 114,425.30
TOTAL COST						\$ 686,551.80